





APPENDIX C

FILM BUILD EXECUTIVE SCHEMATIC (RIGHT AND LEFT SIDES)

MEASUREMENT GAUGE TO USE		BACKUP MEASUREMENT GAUGE	
PELT GAGE		ELCOMETER	
UNIT OF MEASURE			
MIL			
INCH NO			
PRIME BOOTH			
SAMPLE SIZE			
CHART CHAMPION			
FILM ANALYST			
PLANT	DEMO	DEPARTMENT	PAINT
PANEL		CHARACTERISTIC	Taipe Prime
<Exec. Schematic>		LOCATIONS DATA COLLECTED	PELT BOOTH
GAUGE FREQUENCY		EXECUTIVE SCHEMATIC	10/10/00 to 01/21/01
2/SHIFT		MIN. AVG. MAX	0.00 1.10 1.00
CHART BLODY		MIN. SIGMA MAX	0.00 0.00 1.00
PROCESS ENGINEER			

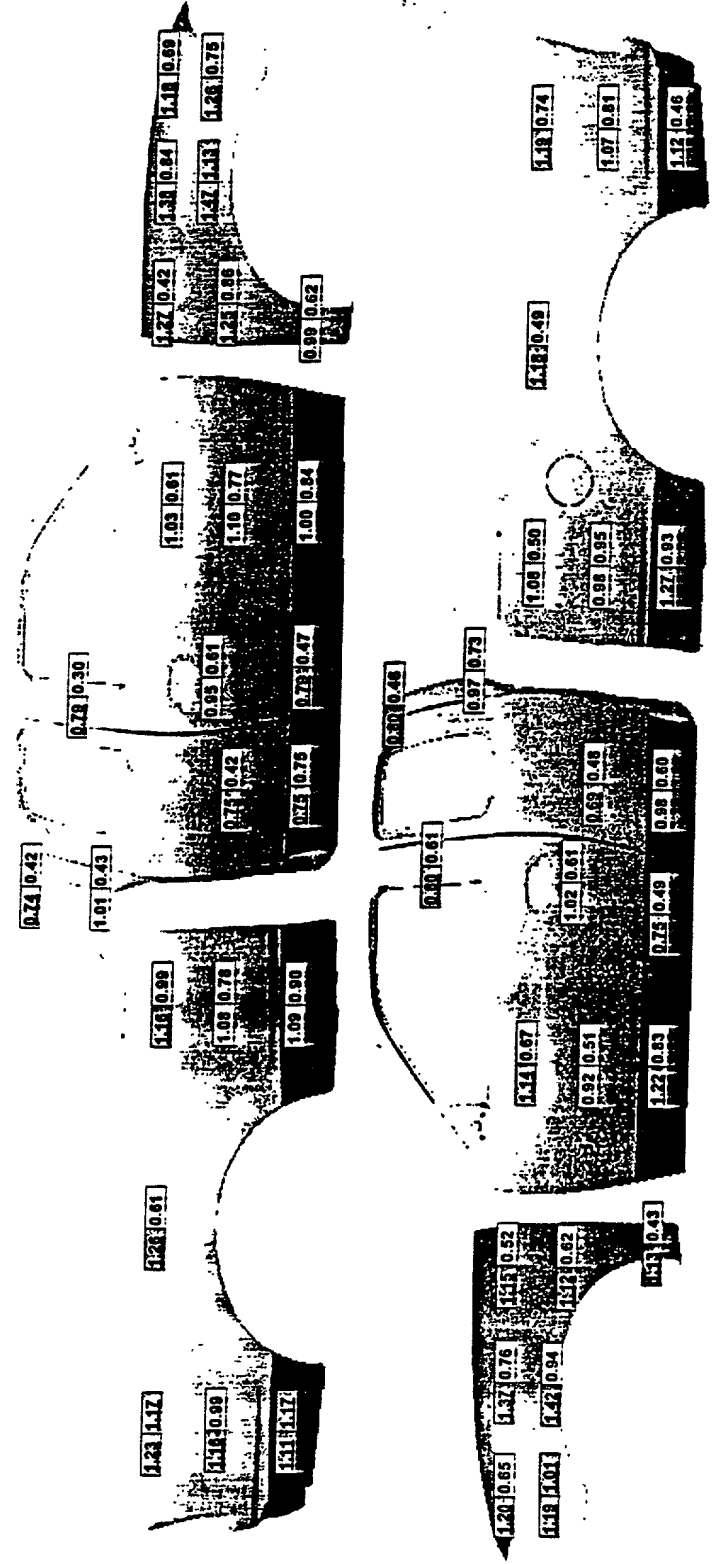
LEGEND	
Average (X)	6 Sigma (s*6)
Data out of spec is underlined and shaded	
DATA RECORD COUNT	20

ANNOTATION SECTION

FILM BUILD SPC  
PAINT APPLICATIONS TEAM

Retrieval System allows storage of Schematic for electronic distribution and review.

Profile includes coatings' averages, process performance and the number of units measured.



APPENDIX D

# Film Build Cpk's Cost Impact Analysis

1ST PREMISE		3RD PREMISE	
<b>VARIATION SELECTION</b> 1) Choose Variability 2) Select First Target Range 3) Average Adjusted to World Class Standard		<b>VARIATION REDUCTION</b> 1) Variability Adjusted to World Class Standard 2) Coating Usage Remains Consistent 3) Average Remains Constant	
Coating Taupe Prime Point 22 Booth na Coating Min. Spec: 0.9 Actual Average: 1.47 Actual Range: 0.21 Actual Cpk: 1.04 Target Range: 0.02 World Class Cpk: 1.5 Effect on Coating Usage: -33.35%		Coating Taupe Prime Point 22 Booth na Coating Min. Spec: 0.9 Actual Average: 1.47 Actual Range: 0.21 Actual Cpk: 1.04 New Range: 0.14 World Class Cpk: 1.5 Effect on Coating Usage: 0.00%	
Approximate Annualized Cost Impact \$ (1,418.12)		Approximate Annualized Cost Impact \$ nil	
2ND PREMISE		4TH PREMISE	
<b>VARIATION SELECTION</b> 1) Choose Variability 2) Select Second Target Range 3) Average Adjusted to World Class Standard		<b>INCREASED MILLAGE</b> 1) Coating Usage Increases 2) Variability Remains Constant 3) Average Adjusted to World Class Standard	
Coating Taupe Prime Point 22 Booth na Coating Min. Spec: 0.9 Actual Average: 1.47 Actual Range: 0.21 Actual Cpk: 1.04 Target Range: 0.01 World Class Cpk: 1.5 Effect on Coating Usage: -36.06%		Coating Taupe Prime Point 22 Booth na Coating Min. Spec: 0.9 Actual Average: 1.47 Actual Range: 0.21 Actual Cpk: 1.04 New Average: 1.74 World Class Cpk: 1.5 Effect on Coating Usage: 18.22%	
Approximate Annualized Cost Impact \$ (1,533.52)		Approximate Annualized Cost Impact \$ 774.61	

Cost per Unit Factors:			
Coating Taupe Prime	Point 22	Usage per Unit (gal) 0.27	Coating Popularity % 25
		Cost per Gallon (\$) 30.00	Booth % Flow 100
		Point % 1.05	Annualized Production (units) 200,000

# APPENDIX E

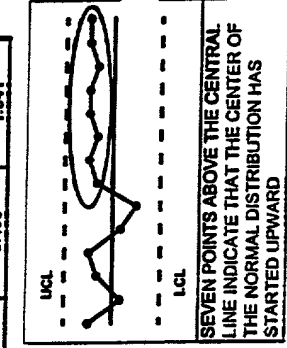
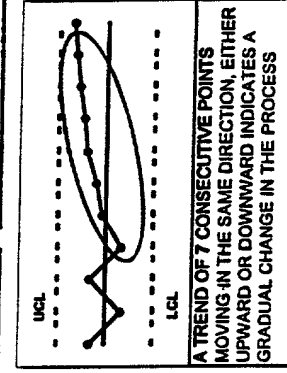
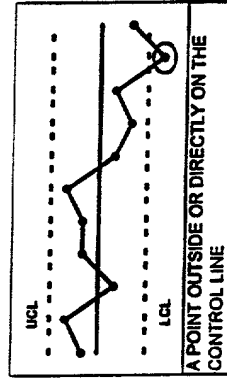
## CONSTANTS AND FORMULAS

FORMULA FOR $\bar{X}$ AND R CHARTS	
$\bar{X}$ -Chart	R-Chart
$\bar{X} = \frac{\sum \bar{X}}{n}$	$CLR = R = \frac{\sum R}{k}$
$CL\bar{X} = \bar{X} = \frac{\sum \bar{X}}{k}$	$UCLR = D_4 \times R$
$UCL\bar{X} = \bar{X} + (A_2 \times R)$	$LCLR = D_3 \times R$
$LCL\bar{X} = \bar{X} - (A_2 \times R)$	$\sigma = \frac{R}{d_2}$
$Cp = \frac{USL - LSL}{6\sigma}$	
$Cpk = \text{minimum of } \frac{USL - \bar{X}}{3\sigma} \text{ or } \frac{\bar{X} - LSL}{3\sigma}$	

CONTROL CHARTS FOR VARIABLE DATA	
$\bar{X}$	Individual Measurement
$\bar{X}$	Subgroup Average
$\bar{X}$	Grand Average
$\Sigma$	Sum of
R	Range = Highest Value - Lowest Value
CL	Center Line
UCL	Upper Control Limit
LCL	Lower Control Limit
k	Number of Subgroups
n	Subgroup Size
$\sigma$	Process Standard Deviation
$A_2$	Factor for $\bar{X}$ Chart Limits
$D_4$	Factor for UCL on R Chart
$D_3$	Factor for LCL on R Chart
USL	Upper Specification Limit
LSL	Lower Specification Limit
$d_2$	Factor for estimating Process Standard Deviation

Chart X	
n	A <sub>2</sub>
2	1.880
3	1.023
4	0.729
5	0.577
6	0.483
7	0.419
8	0.373
9	0.337
10	0.308
11	0.285
12	0.266
13	0.249
14	0.235
15	0.223
16	0.212
17	0.203
18	0.194
19	0.187
20	0.180
21	0.173
22	0.167
23	0.162
24	0.157
25	0.153

Range Chart R			
n	d <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>
2	1.128	na	3.270
3	1.693	na	2.574
4	2.059	na	2.282
5	2.326	na	2.114
6	2.534	na	2.004
7	2.704	0.078	1.924
8	2.847	0.136	1.864
9	2.970	0.184	1.816
10	3.078	0.223	1.777
11	3.173	0.256	1.744
12	3.258	0.283	1.717
13	3.336	0.307	1.693
14	3.407	0.328	1.672
15	3.472	0.347	1.653
16	3.532	0.363	1.637
17	3.588	0.376	1.622
18	3.640	0.391	1.608
19	3.689	0.403	1.597
20	3.735	0.415	1.585
21	3.778	0.425	1.575
22	3.819	0.434	1.566
23	3.858	0.443	1.557
24	3.895	0.451	1.548
25	3.931	0.459	1.541



## CONSTANTS AND FORMULAS

# Film Build Cpk's Cost Impact Analysis

## VARIATION SELECTION

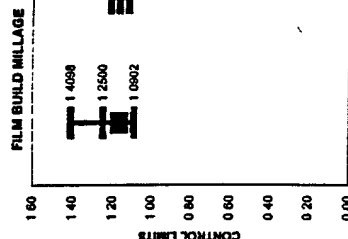
- 1) Choose Variability  
2) Select First Target Range  
3) Average Adjusted to World Class Standard

Coating: Black Prime  
Panel: Hood  
Booth: na

Coating Min. Spec :	0.9
Actual Average:	1.25
Actual Range:	0.68
Actual Cpk:	0.587
Subgroup Size,	14
Target Range:	0.2
World Class Cpk:	1.5
Effect on Coating Usage	-8.87%

**Effect on Coating Usage -6.87%**

**Approximate Annualized Cost Impact**



**ACTUAL. WORLD CLASS**  
**Within World Class - UCL - LCL - A**

## VARIATION SELECTION

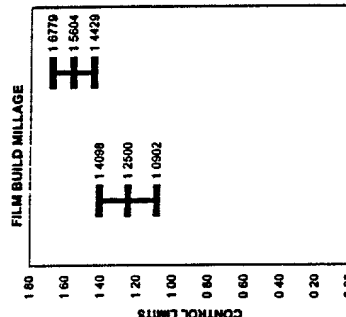
- 1) Choose Variability  
2) Select Second Target Range  
3) Average Adjusted to World Class Standard

Coating: Black Prime  
Panel: Hood  
Booth: na

Coating Min. Spec..	0.9
Actual Average:	1.25
Actual Range:	0.68
Actual Cpk:	0.587
Subgroup Size:	14
Target Range:	0.5
World Class Cpk:	1.5
Effect on Coating Usage	24.81%

Effect on Coating Usage 24.83%

**Approximate Annualized Cost Impact**



■ Within World Class    UCL    LCL    Average

## **VARIATION REDUCTION**

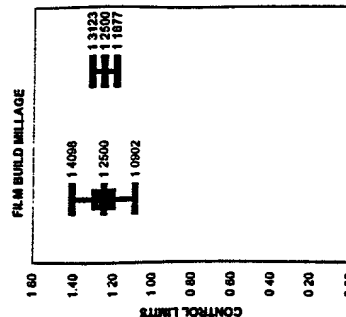
- 1) Variability Adjusted to World Class Standard
- 2) Coating Usage Remains Consistent
- 3) Average Remains Constant

Coating: Black Prime  
Panel: Hood  
Booth: na

Coating Min. Spec.:	0.9
Actual Average:	1.25
Actual Range:	0.68
Actual Cpk:	0.587
Subgroup Size:	14
New Range:	0.27
World Class Cpk:	1.5
Effect on Coating Usage	0.00%

Effect on Coating Usage 0.00%

**Approximate Annualized Cost Impact**



■ Within World Class    ■ UCL    ■ LCL    ■ Average

## INCREASED MILLAGE

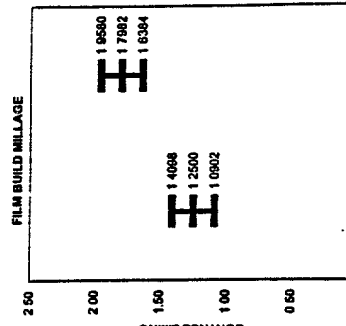
- 1) Coating Usage Increases
- 2) Variability Remains Constant
- 3) Average Adjusted to World Class Standard

Coating: Black Prime  
Panel: Hood  
Booth: na

Coating Min. Spec.:	0.9
Actual Average:	1.25
Actual Range:	0.68
Actual Cpk:	0.587
Subgroup Size:	14
New Average:	1.7982
World Class Cpk:	1.5
Effect on Coating Usage	- 43.85%

Effect on Coating Usage - 43.85%

**Approximate Annualized Cost Impact**



ACTUAL	WORLD CLASS
Within World Class	UCL - LCL - Average

Cost per Unit Factors:							
Coating:	Panel:	Usage per Unit (gal.):	Cost per Gallon (\$):	Coating Popularity %:	Panel %:	Booth % Flow:	Annualized Production (units)
Black Prime	Hood	0.27	27	25	15	100	200,000

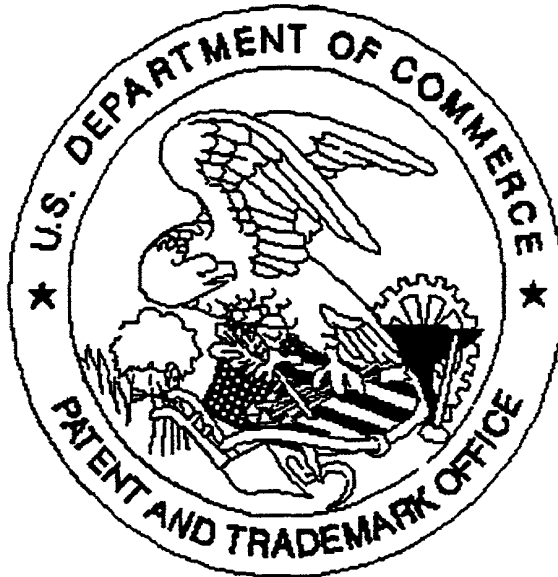
APPENDIX G

Variability Reduction Tools

Automotive Facility  
Booth 2 Clear Coat Film Build Cost Analysis

<u>Panel</u>	<u>Millage Adjusted, Variability Constant</u>	<u>Range Variability Adjusted: 0.10 Mills</u>	<u>Range Variability Adjusted: 0.20 Mills</u>
Left	\$ 214,576	\$ 7,333	\$ 25,674
Right	\$ 263,413	\$ 22,571	\$ 41,838
Hood	\$ 161,393	(\$ 39,670)	(\$ 23,712)
Roof	\$ 84,819	(\$ 19,053)	(\$ 505)
Deck	<u>\$ 40,453</u>	<u>(\$ 20,413)</u>	<u>(\$ 10,903)</u>
Totals:	\$ 764,654	(\$ 49,232)	\$ 32,392

United States Patent & Trademark Office  
Office of Initial Patent Examination -- Scanning Division



Application deficiencies found during scanning:

☐ Page(s) \_\_\_\_\_ of \_\_\_\_\_ were not present  
for scanning. (Document title)

☐ Page(s) \_\_\_\_\_ of \_\_\_\_\_ were not present  
for scanning. (Document title)

- ① NUMBER OF SHEETS OF DRAWINGS IS 2 NOT 9  
② APPENDIX E IS DARK

☐ *Scanned copy is best available.*